

Appl. No. 10/643,682

Reply to Office Action mailed September 6, 2006

R E M A R K S

Claims 1 and 5 were amended to include features of claim 8.

The feature of "positive electrode" (anode) added to claims 1, 5 and 30 is supported in the specification on page 12, line 8 and Figs. 3A and 3B.

Claim 4 was amended by including the feature of claim 24.

New claim 36 is supported in the specification on page 12, lines 11 to 13.

New claim 37 is supported in the specification on page 12, lines 8 and 9.

Applicants' claim 1 is directed to a chemical treatment method by which a metal film formed on a substrate is etched into a predetermined pattern comprising:

(a) providing a material comprising a first metal film coated on a substrate and a second metal film formed on the first metal film, the first metal film having a metal passivated layer on an exposed surface thereof, the first metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof, the second metal film having a predetermined pattern,

Appl. No. 10/643,682

Reply to Office Action mailed September 6, 2006

(b) immersing the material and a positive electrode in an acidic reduction treatment solution containing an acid radical, wherein a portion of the first metal film on the material is dipped into the acidic reduction treatment solution, connecting the positive electrode and a metal portion of the material to an electrolytic circuit such that the material is a cathode and applying an electric current to the cathode and the positive electrode to carry out an electrolysis, thereby producing nascent hydrogen, whereby the nascent hydrogen reduces the metal passivated layer to the first metal or an alloy thereof; and then .

(c) etching the first metal film by contacting an exposed portion of the first metal or an alloy thereof with an acidic etching treatment solution to form the predetermined pattern.

Applicants' claim 5 concerns a chemical treatment method by which a metal film formed on a substrate is etched into a predetermined pattern comprising:

(a) providing a material comprising a first metal film coated on a substrate and a second metal film formed on the first metal film, the first metal film having a metal passivated layer on an exposed surface thereof, the first

Appl. No. 10/643,682

Reply to Office Action mailed September 6, 2006

metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof,

(b) immersing the material and a positive electrode in a reduction treatment solution containing a halogen ion, wherein a portion of the first metal film on the material is dipped into the reduction treatment solution, connecting the positive electrode and a metal portion of the material to an electrolytic circuit such that the material is a cathode and applying an electric current to the cathode and the positive electrode to carry out an electrolysis, thereby producing nascent hydrogen, whereby the nascent hydrogen reduces the metal passivated layer to the first metal or an alloy thereof; and

(c) dipping the material into an acidic etching treatment solution so that an exposed portion of the first metal or an alloy thereof is in contact with the acidic etching treatment solution to form a predetermined pattern.

Claims 1, 2, 4 to 14, 24, 25 and 27 to 29 were rejected under 35 USC 102 as being anticipated by Wei (USP 4,350,564) for the reasons set forth on pages 2 to 3 of the Office Action.

Appl. No. 10/643,682
Reply to Office Action mailed September 6, 2006

The following is a comparison of the electrolysis reduction methods of applicants' present claims and Wei:

1) In applicants' claims, the "material" as defined in step (a) of applicants' claims 1 and 5 is a cathode, and a positive electrode, such as a plate, separate from said material, is an anode. In contrast thereto, in Wei, Cr which corresponds to the first metal film of applicants' present claims is the cathode, and Al (corresponding to the second metal film of the present claims) which is arranged on Cr, is the anode.

2) A metallic material is immersed in a diluted acid solution, and a metal, e.g., Cr, is etched by utilizing, for reduction of a passive layer, hydrogen discharged at the interface of the Cr.

As described above, although applicants' present claims and Wei may appear to be similar in utilizing generated hydrogen in the reduction of the passive layer as in item 2) above, the present claims and Wei are substantially different regarding item 1) above.

The position is apparently taken in the Office Action that if Al in Wei is regarded as the positive electrode of the present claims, the present claims and Wei are the

Appl. No. 10/643,682

Reply to Office Action mailed September 6, 2006

same. Applicants respectfully disagree with this position for the following reasons.

As discussed above, applicants' present claims 1 and 5 describe the "material" as defined in step (a) of applicants' claims 1 and 5 is the cathode, and electrolysis reduction is carried out using a positive electrode, such as an electrode plate, separate from the material, as an anode. In the electrolysis reduction reaction of step (b) in applicants' claims 1 and 5, a portion of the first metal film exposed on said material is dipped into a reduction treatment solution (in claim 1, the reduction treatment solution contains an acid radical; in claim 5, the reduction treatment solution contains a halogen ion) and reduced, and then in step (c), the exposed first metal film is immersed in an acidic etching treatment solution to etch the entire first metal film exposed on the material. Wei does not disclose or suggest such steps.

It is therefore respectfully submitted that claims 1 and 5 are novel, and that the claims dependent on claims 1 and 5 are thus also novel.

Applicants have informed the undersigned that it is considered that an etching method of dipping a portion of,

Appl. No. 10/643,682

Reply to Office Action mailed September 6, 2006

and not the entire first metal film exposed on said material, recited in applicants' claims 1 and 5, into a reduction treatment solution (in claim 1, the reduction treatment solution contains an acid radical; in claim 5, the reduction treatment solution contains a halogen ion) to reduce the portion, and immersing the exposed first metal film in an acidic etching treatment solution to etch the entire first metal film exposed on the material, when etching a predetermined pattern on a metal on a substrate by a chemical treatment method, such as recited in applicants' present claims, did not exist as prior art before applicants' invention.

Withdrawal of the rejection under 35 USC 102 is thus respectfully requested.

Reconsideration is requested. Allowance is solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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